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—   *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA,*

(54) **Title:** USE OF MACHINE LEARNING FOR CLASSIFICATION OF MAGNETO CARDIOGRAMS
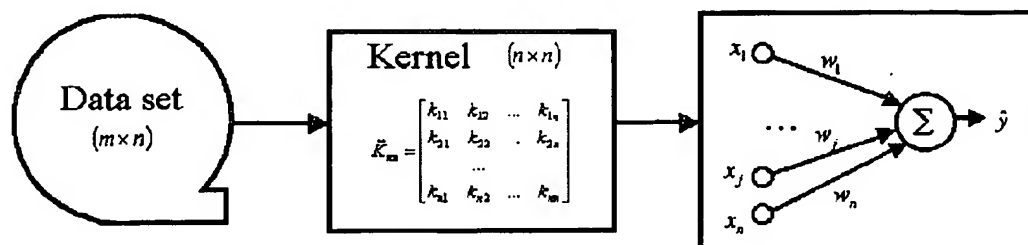
(57) **Abstract:** The use of machine learning for pattern recognition in magnetocardiography (MCG) that measures magnetic fields emitted by the electrophysiological activity of the heart is disclosed herein. Direct kernel methods are used to separate abnormal MCG heart patterns from normal ones. For unsupervised learning, Direct Kernel based Self-Organizing Maps are introduced. For supervised learning Direct Kernel Partial Least Squares and (Direct) Kernel Ridge Regression are used. These results are then compared with classical Support Vector Machines and Kernel Partial Least Squares. The hyper-parameters for these methods are tuned on a validation subset of the training data before testing. Also investigated is the most effective pre-processing, using local, vertical, horizontal and two-dimensional (global) Mahanalobis scaling, wavelet transforms, and variable selection by filtering. The results, similar for all three methods, were encouraging, exceeding the quality of classification achieved by the trained experts. Thus, a device and associated method for classifying cardiography data is disclosed, comprising applying a kernel transform to sensed data acquired from sensors sensing electromagnetic heart activity, resulting in transformed data, prior to classifying the transformed data using machine learning.

SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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